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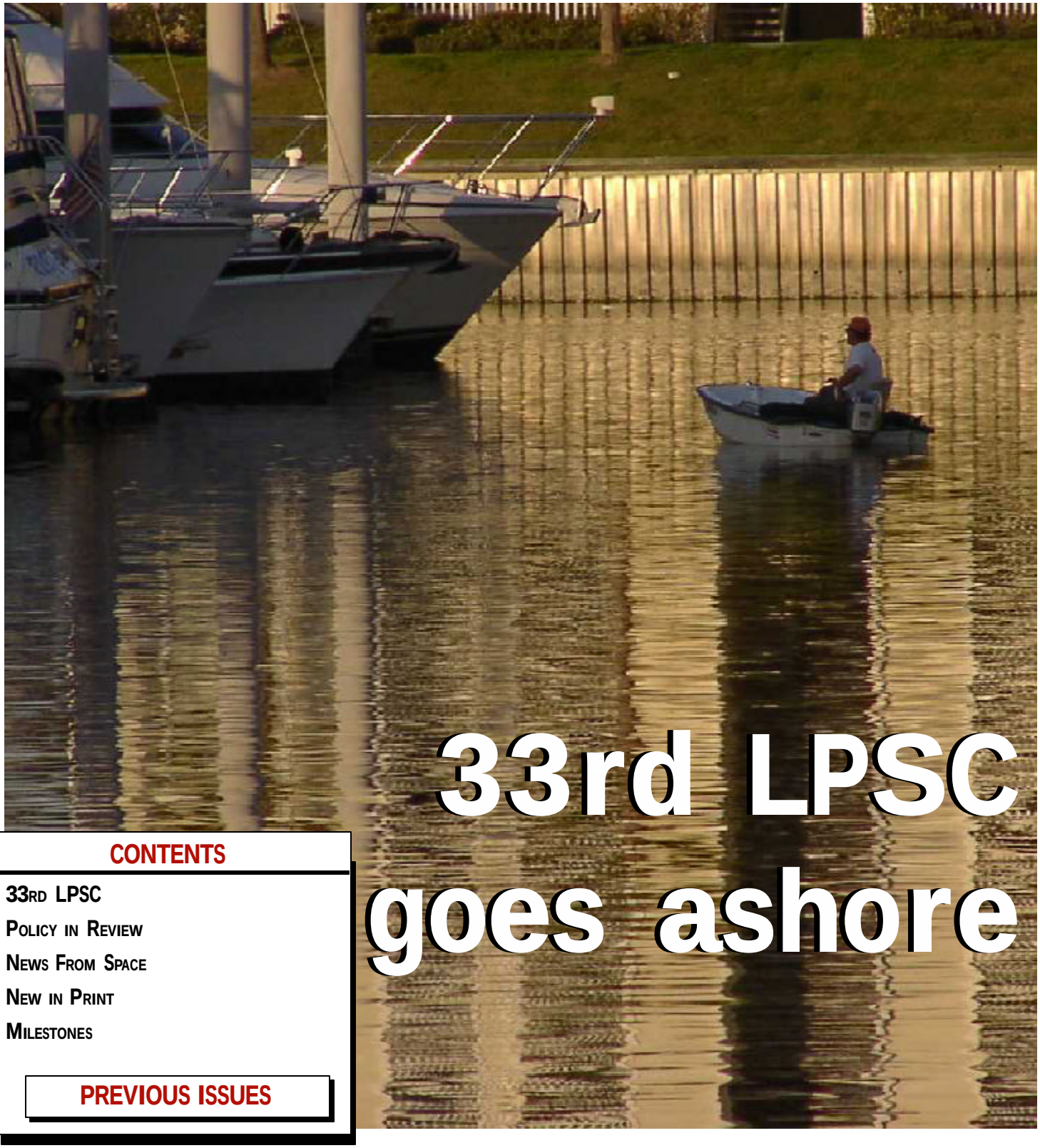

33rd LPSC goes ashore

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PREVIOUS ISSUES

Change brings success for 33rd LPSC

Photo by Debra Rueb

From my admittedly biased viewpoint, the 33rd LPSC was a great success. The comments we accumulated during the conference covered a very wide range, but I can report, I think without bias, that they were overwhelmingly positive about both the running of the conference and the new venue. We did pass out survey sheets in an attempt to sample the opinions of the conferees. These have been useful to us with a diversity of suggestions and on a 1–5 scale, with 5 being the most positive, we scored a 4. However, we are well aware that only a subset of the conferees took the time to fill out and submit these survey forms.

What problems did we have? There was concern as to the geometry of the some of the session rooms, which are rather long and narrow, with some restricted visibility of the lower portion of the projection screens from the back of the rooms. There was also some concern about the noise generated by conversations in the rear of the rooms and from the coffee klatch just outside the doors. In addition, we were not always able to hear questions from the floor when microphones were not used or were out of reach. These are all issues we can work on for the future, though we are restricted in terms of any change in room geometry.

My impression is that the most commonly and sometimes aggressively voiced complaint dealt with the venue for the poster sessions. It had appeared adequate in the original planning but the number of posters so filled the available space that getting around, and getting to a particular poster, proved to be a major hassle. No question we need more space or fewer posters per session. The problems of overcrowding and lack of mobility were not enhanced by the decidedly "gym-like" aroma that arose as the number of participants and overall room temperature increased.

We also had some people who struggled with parking. In fact there always was adequate parking, but we needed to do a better job of making people aware of what was available and where.

What successes did we have? The greatest single success was simply that the conference came off as planned. As a consequence of the tragic events of September 11, increased security at the Johnson Space Center meant that the

About the cover: *The cover photo, overlooking the South Shore Harbour Marina, was taken by Dr. Don Burt of the Lunar and Planetary Institute.*

Photo by Don Burt

Conference attendees mill at the LPI's Open House on Sunday.

33rd LPSC at a Glance

Number of registrations received: *1200*
Actual number of attendees: *1164*

Abstracts Received: *1075*
Abstracts Accepted: *1046*

Foreign Attendance

Argentina: 1
Australia: 8
Belgium: 1
Canada: 18
Czech Republic: 1
Denmark: 3
Finland: 4
France: 21
Germany: 35
Ghana: 3
Hong Kong: 1
Hungary: 4
Italy: 11
Japan: 65
The Netherlands: 4
Norway: 2
Puerto Rico: 4
Russia: 5
Slovak Republic: 2
South Africa: 1
Spain: 5
Switzerland: 7
United Kingdom: 35

Total Foreign Attendees: 241

Don Burt photo

Janice Bishop, Gary Hansen, and Laurel Kirland react to a presentation during the Mars Spectroscopy lunch seminar on Tuesday.

Gilruth Center was not available to us for 2002. This necessitated a frantic search for a new venue and a substantial increase in the amount of planning required with a substantial decrease in the planning time available. I take great pride and no credit for the way in which the LPI staff rose to the occasion, found what turned out to be an excellent venue on short notice, and somehow succeeded in pulling off a conference, with over 1100 highly individualistic attendees, with remarkably few flaws.

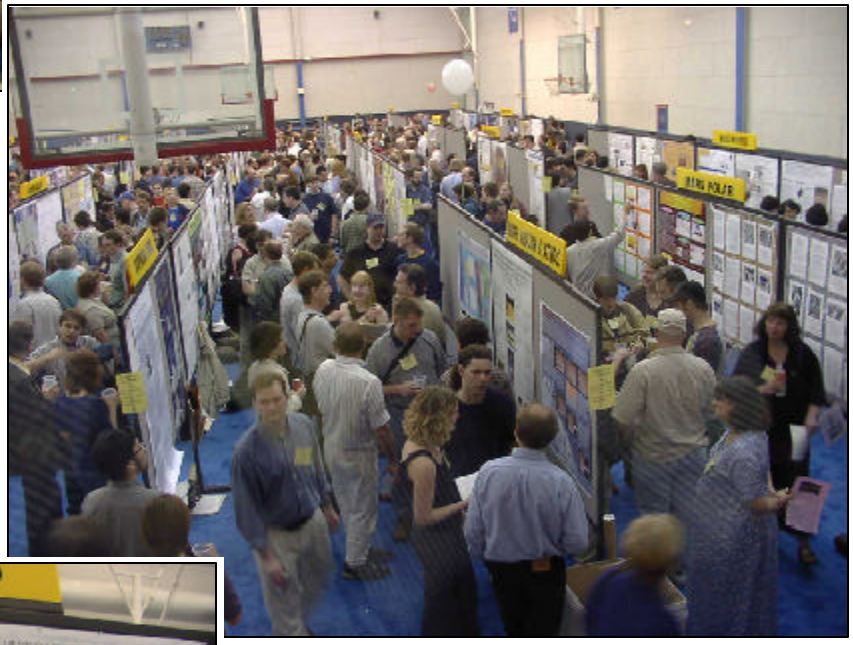
What is in store for future LPSCs? Soon after the conference was over, and immediately after our conference debriefing, a decision had to be made with respect to the venue for the 34th LPSC in 2003. Based on a variety of factors, we have decided to return to South Shore Harbour for the 2003 LPSC.

There are advantages and disadvantages to both venues that we weighed and led us to the decision to return next year to South Shore Harbour. Gilruth, to which we have a sentimental attachment, raises problems with respect to both adequate parking and availability of local catering (the NASA cafeteria will remain behind a fence and the Gilruth will no longer be on the JSC grounds). To reoccupy Gilruth would put the poster sessions back at University of Houston–Clear Lake, which is only available during their spring break. This would mean having the conference the first week of March, and pushing all the deadlines forward (abstracts would be due before Christmas). We have negotiated with South Shore Harbour for substantial additional space to take care of the inadequate poster area. We believe that we will have enough space so that all posters will be available for viewing all week, while maintaining the evening sessions for discussions with the authors.

Using South Shore Harbour allows us to schedule the 34th LPSC for the week of **March 17,** so mark your calendars. The abstract deadline is likely to be around January 14. For all aspects of LPSC we welcome your comments, suggestions, and critiques. See you by the Shore in 2003.

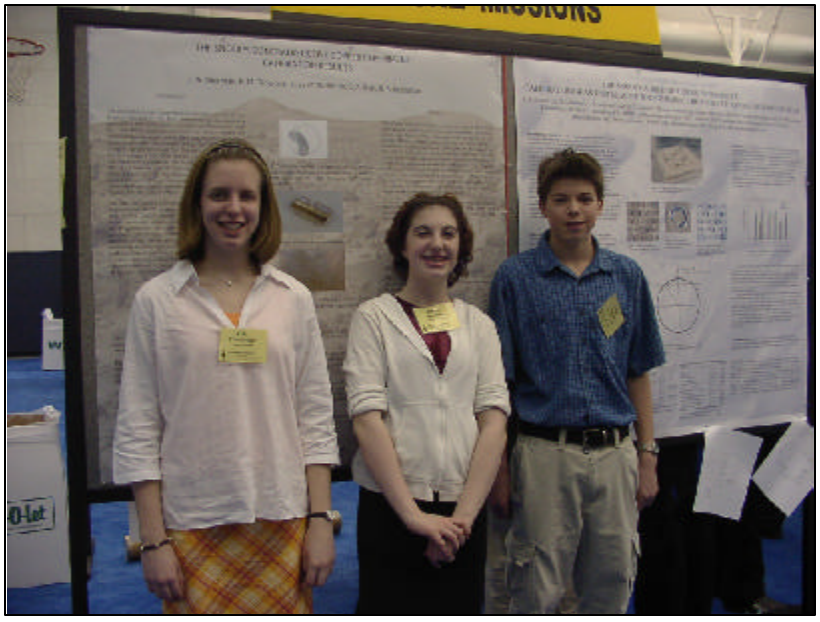
—Arch Reid, LPI Interim Director

Christian Koeberl of the University of Vienna chats with LPI Interim Director Arch Reid at the poster session.



The poster sessions were held at the South Shore Harbour Fitness Center near the hotel.

All photos this page courtesy Don Burt



Secondary students Kelly Trowbridge, 15, Jessica Sherman, 15, and L. E. Moller, 13, present their posters at the Mars Future Missions session on Thursday. The students worked with advisors from the Jet Propulsion Laboratory.

Don Burt photo

(left) LPI Computer Center Manager Kin Leung (at right) talks to LPI staff member German Rodriguez in the special computing center set up for scientists at the conference.

(below) LPI Scientist Christopher Herd tests his team's chili at the Chili Cookoff on Wednesday night. Herd's team, including LPI scientists Laurel Kirkland, Pat McGovern, and Julie Moses, as well as Randy Reynolds of Raytheon, won the prize for best local chili for the creation, "Olympic Coercion Chili."

Don Burt photo

Debra Rueb photo

(left) USRA President David Black congratulates Joe Boyce at a special reception held in honor of his retirement from NASA Headquarters.

POLICY IN REVIEW

The following letter, directed to Dr. Colleen Hartman, director of NASA's Solar System Exploration Division, and Mr. Orlando Figueroa, director of the Mars Exploration Program, presents the most recent findings of the Solar System Exploration Committee. Dr. Michael Drake, chair of that committee, has submitted this letter to this forum for public review. The layout and some emphases have been changed for publication purposes.

January 4, 2002

Dear Colleen and Orlando:

The Solar System Exploration Subcommittee (SSES) of the Space Science Advisory Committee (SScAC) met on December 3 and 4 in Cocoa Beach, Florida. The purpose of this letter is to summarize the findings and recommendations of that meeting.

Discussion of important issues at this meeting was constrained by the embargo on the FY 2003 budget, which prevented NASA officials from providing information critical to many of the issues before the committee. The embargo therefore precluded useful discussion of many topics. It is recommended that the SSES hold its meetings only at times when the budget for the following fiscal year is not embargoed.

Dr. Hartman gave a general briefing on the state of the Solar System Exploration Program. While the state of Solar System Exploration Program appears to be robust, there are severe budgetary and programmatic problems.

Deep Space Systems/Outer Planets

Congress provided funds for both a Pluto/Kuiper Belt mission and the Europa Orbiter mission and directed NASA to select the winning team for the Pluto/Kuiper Belt mission. However, inadequate funds were appropriated for both missions and the Pluto/Kuiper Belt mission is not budgeted for future years, leading to uncertainty in every budget cycle. Europa Orbiter is capped by Congress at $1 billion. Four independent estimates of the cost of Europa Orbiter were around $1.2 billion. Basically, it costs about $1 billion to get into orbit around Europa regardless of the scientific payload. There remains the problem of three RTGs being needed to power both missions, while only two are available.

The SSES is concerned that the Europa Orbiter mission may not be achievable within the current budgetary cap. The SSES strongly urges NASA to investigate alternative approaches to the Europa Orbiter mission.

The SSES requests a report from the Europa Study Team at the February 28 – March 1, 2002, meeting of the SSES in Washington. Specifically, it would be valuable to hear about any discussion of the costs of non-Europa orbiting missions and the science benefits of such missions relative to the Europa Orbiter mission.

The SSES notes that missions to the outer solar system are expensive. The Pluto/Kuiper Belt mission sets the floor for the cost of flybys at $500 million. Orbital and rendezvous missions will be necessarily more expensive.

The SSES reaffirms its support for the Pluto/Kuiper mission. This mission must be conducted now to take advantage of the unique orbital alignment allowing a Jupiter gravity-assist to reach Pluto while it is still close to perihelion. While future technologies may provide similarly short travel times, they will probably arrive at Pluto too late to carry out much of the high value science.

Integrated Campaign of Planetary Missions

Dr. Hartman discussed what the Solar System Exploration Program might look like in the latter half of the decade. Using her run-out FY 2007 budget, she looked at an Integrated Campaign of Missions consisting of Discovery (~$300 million), "Discovery-Plus" (~$500 million), and Major ($700–$850 million) missions. Technology development would be an important component. No $1 billion missions after Europa Orbiter were considered for the next decade. Such an approach could lead to six competed Discovery missions, three competed Discovery-Plus missions, and two Major missions. Whether Major missions would be competed depends to some extent on the need to maintain JPL core capabilities. Such an Integrated Campaign would lead to 11 missions in 12 years, with robust technology, research and analysis, and data analysis programs included. ***The SSES endorses the Integrated Campaign concept as worthy of further development.***

Mars Exploration Program

Mr. Figueroa gave a general briefing on the state of the Mars Program. He noted that the Mars Exploration Rover mission (MER) remains on schedule and on budget after an infusion of an additional $50 million in reserves. The $50 million infusion of funds came at the expense of the FY 2007 rover development, possibly causing delay of the Mars Smart Lander mission to FY 2009.

Nevertheless, schedule and mass margins remain of concern. Any major changes to MER will occur after major milestone reviews in January and February 2002, if needed. The SSES concurs in this assessment. MER remains a high-risk program.

It appears clear that the design of the 2007 Mars Smart Lander (MSL) will be predicated by, and to some degree predicate, the timing and nature of Mars Sample Return (MSR). Decisions concerning the Mars Smart Lander must be made in the next few months, and will critically influence the robustness and community support of the Mars Exploration program as currently envisioned. ***Discussion was limited by the FY 2003 budget embargo and will be a major item of discussion of the February 2002 SSES meeting in Washington.***

It was agreed that MEPAG would be the principal mechanism for developing the Mars portion of the next solar system exploration program roadmap**.** ***A presentation from MEPAG is requested at the next SSES meeting.***

The SSES commends Mr. Figueroa for implementing of the Mars Exploration Review Team (MERT) and the Mars Fundamental Research Program.

"Inner Solar System" Task Force

Dr. Roger Phillips assumed leadership of the Inner Solar System Task Force. He has conducted a survey of comments submitted as community input for the National Academy Solar System Decadal Survey. After discussion it was concluded that asteroids would be covered by this task force. ***A preliminary written report suitable for inclusion in the Roadmap is expected by the end of January.***

"Outer Solar System" Task Force

A detailed presentation was made by Dr. McKinnon. A careful analysis of how missions map back to Campaigns and Quests was conducted. The SSES was impressed by Dr. McKinnon's analysis. ***Written material in Roadmap form will be available by end of January for discussion at the February SSES meeting.***

Astrobiology

Dr. Meyer and Dr. Pilcher will lead an activity to develop a uniform text for the treatment of astrobiology in the Roadmaps of all relevant subcommittees.

Astrobiology now reports through the SSES. ***A briefing from the Astrobiology Taskforce is requested at the next meeting of the SSES.***

Research and Analysis

Research and Analysis is part of a continuum involving the posing of new questions, mission conception, mission design, mission flight, data analysis, research and analysis, posing new questions, and so on. Research and Analysis also trains young scholars, a critical component of workforce development that keeps U.S. planetary science at the cutting edge.

Research and Analysis is more important to the Solar System Exploration Division than to other Space Science Divisions. It integrates mission data into the deep body of human knowledge. It provides "missions" where no spacecraft can go — back in time, into the interior of planets, etc. It provides "free space missions" in the form of sample returns from the Moon, Mars, asteroids, and comets.

A Research and Analysis writing team for the Roadmap will be appointed at the next SSES meeting in February 2002.

Technology

The SSES reiterates its strong commitment to a robust technology development program. Exploration of the outer solar system, interstellar space, and human missions will be greatly enabled with the development of new advanced technology lines. These technology lines should not be tied to specific missions, but should take the long view of enabling robust outer planet, interstellar, and human exploration. It is essential to develop advances in space propulsion systems. It is essential to develop advanced RTGs. Aerocapture, automatic guidance, and precision navigation and control technologies must also be developed.

Dr. Hartman has formed a Solar System Exploration Technology Task Force. Its final report to the SSES is expected in June 2002.

Roadmap Guidelines

Dr. Allen discussed the timeline for the Roadmapping exercise. NASA Headquarters needs the Roadmap by September 2002. A "Consensus Workshop" will be held in November 2002. The Office of Space Science Strategic Plan must be ready for discussion by the Space Science Advisory Committee in July 2003. The Strategic Plan will be released in September 2003.

The suggested guidelines are 60 pages total length in portrait layout.

Dr. Stetson made a presentation of JPL's possible contributions to the Roadmap.

Government Performance and Results Act (GPRA)

Dr. Allen led the SSES is a discussion of the performance of the Solar System Exploration Division. All objectives were either met or were exceeded in FY 2001.

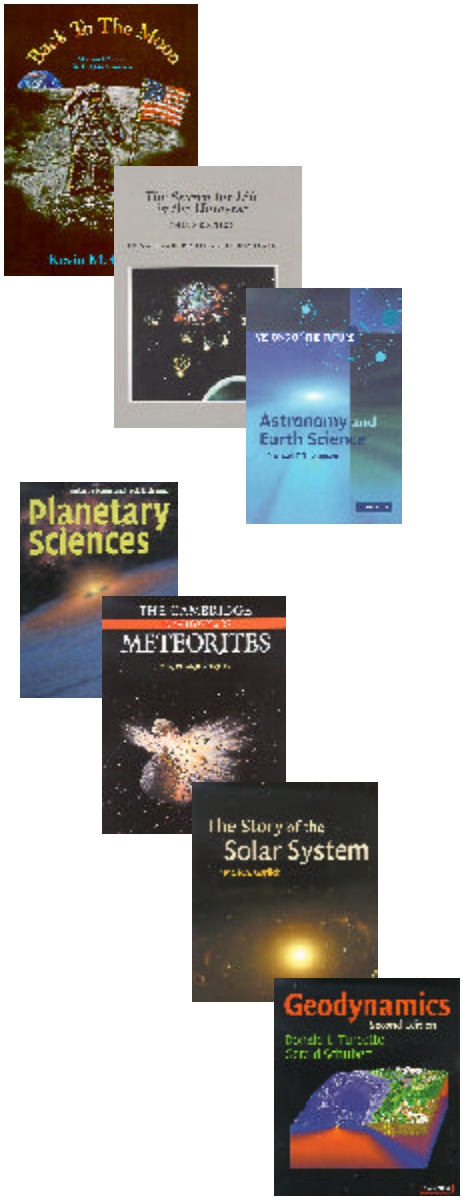
With kindest regards.

Sincerely,

Michael J. Drake, Chair
Solar System Exploration Subcommittee

NEW IN PRINT

These publications are available from booksellers or the publisher listed. Please note that the LPI does not offer these books through its order department.



RECENTLY PUBLISHED

Back to the Moon: Mankind Returns to the Lunar Surface. By Kevin M. Caruso. Aerospace1 Publications, 2002. 282 pp. Hardcover, $35. Written by an electrical engineer who serves as the NASA JPL Solar System Ambassador for Illinois, this accessible book reviews the technology, planning, and benefits of a near-future mission to the Moon. The book is targetted at middle- to high-school students as well as teachers.

The Search for Life in the Universe, Third Edition. By Donald Goldsmith and Tobias Owen. University Science Books, 2002. 574 pp. Hardcover, $62.50. Update of standard astrobiology text. The book covers the fundamentals of the relevant astronomy, astrophysics, and planetary sciences, as well as an overview of biology, geology, evolution, the discovery of extrasolar planets, and the possibilities of interstellar travel and communication.

Visions of the Future: Astronomy and Earth Science. Edited by J. M. T. Thompson. Cambridge Univ. Press, 2001. 238 pp. Softcover, $24.95. Revised collection of scholarly articles originally published in a special millennium issue of the Royal Society's *Philosophical Transactions* (the world's longest-running scientific journal). Topics include the Big Bang, solar system exploration, Earth's deep interior, and current scientific ideas about climate change.

Planetary Science. By Imke de Pater and Jack J. Lissauer. Cambridge Univ. Press, 2001. 528 pp. Hardcover, $75. One reviewer termed this upper-level introductory text "a Goldilocks book, not too hard and not too soft." The book presents a comprehensive overview of the planetary science field, explaining the physical, chemical, and geological processes that govern the formation, motions, and properties of planets, satellites, asteroids, comets, and planetary rings.

Cambridge Encyclopedia of Meteorites. By O. Richard Norton. Cambridge Univ. Press, 2002. 354 pp. Hardcover, $50. Illustrated volume with more than 150 full-color images, this large-format book provides a thorough guide to extraterrestrial rocks. Designed to serve as a reference source for students, teachers, and scientists, it includes detailed descriptions of every meteorite type, terrestrial impact crater sites, tables of recent falls, and descriptions of important meteorite collections.

The Story of the Solar System. By Mark A. Garlick. Cambridge Univ. Press, 2002. 154 pp. Hardcover, $30. Colorful, well-illustrated overview begins with the birth of the Sun and moves into an explanation of the steps involved in forming the bodies of the solar system. The volume is designed for a general audience.

Geodynamics, Second Edition. By Donald L. Turcotte and Gerald Schubert. Cambridge Univ. Press, 2002. Hardcover, $110. Softcover, $45. Update of classic graduate textbook on the fundamental physical processes that propel geological change. Includes up-to-date discussions on satellite observations, planetary morphology, thermal cooling, and chemical mantle dynamics.

Also Received

The Cambridge Encyclopedia of the Sun. By Kenneth R. Lang. Cambridge Univ. Press, 2001. Hardcover, $35.

Storms in Space. By John W. Freeman. Cambridge Univ. Press, 2002. Hardcover, $27.95.

Color and Light in Nature, Second Edition. By David K. Lynch and William Livingston. Cambridge Univ. Press, 2001. Hardcover, $85. Softcover, $29.95.

Rocket and Space Corporation Energia: The Legacy of S. P. Korolev. Edited by Robert Godwin. Apogee Books, 2001. Softcover, $19.95.

NEWS FROM SPACE

Near-Earth Binary Asteroids Appear To Be Common

J. L. Margot, Calif. Inst. of Technology

A schematic diagram representing the sizes of the 2000 DP107 components and their separation, with the Golden Gate bridge for scale.

Binary asteroids — two rocky objects orbiting about one another — appear to be common in Earth-crossing orbits, astronomers reported in April in the journal *Science*. This makes them an important new asteroid class to study in case future generations find one coming near Earth.

"If you see two bodies orbiting each other, you can tell how far away from each other they are and how fast they go around each other," said Dr. Lance Benner, an asteroid researcher and an author of the paper from NASA's Jet Propulsion Laboratory, Pasadena, California. "This helps us to determine the asteroids' mass, volume, internal structure and what they're made of."

Using the world's two most powerful astronomical radar telescopes, Benner and his colleagues, led by Jean-Luc Margot of the California Institute of Technology, Pasadena, estimated that about 16 percent of near-Earth asteroids larger than 200 meters (219 yards) across are likely to be binary systems. These systems may have been formed by the pull of gravity during close encounters with Earth, Mercury, Venus, or Mars.

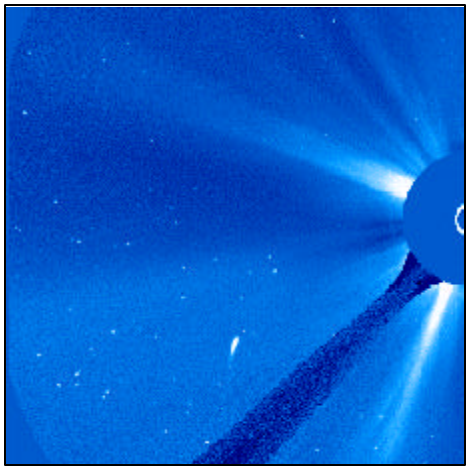
The first near-Earth binary asteroid ever detected, 2000 DP107, was found by radar in September 2000 at NASA's Goldstone, California, tracking telescope facility. Subsequent observations were made at the National Science Foundation's Arecibo Observatory in Puerto Rico, operated by Cornell University. Like Earth's Moon, the smaller (300-meter) body always presents the same face to the larger (800 meters, or about a half-mile diameter) asteroid body as it orbits. To date, five near-Earth binary systems have been identified by radar. But none of them, adds radar astronomer Jon Giorgini, have orbits that could threaten Earth, at least through this century.

Near-Earth asteroids may become binaries when the planets' much larger gravities pull on their rubble-clustered bodies, distorting them and sometimes breaking off a satellite. Theoretical and modeling results show that binary asteroids most likely form when the asteroids closely encounter the inner planets Earth or Mars, sometimes just 10,000 miles from a planet's surface.

"Of course, the most important thing to know about any asteroid is whether it is two objects or one, and this is why we want to observe these binaries with radar whenever possible," said Dr. Steve Ostro, a senior research scientist at JPL. "Radar is the best way to identify interesting and potentially hazardous asteroids. Radar observations provide information that can be later used by spacecraft to do more detailed studies efficiently and at lower cost."

Previous evidence that near-Earth binary asteroids were common came from craters on the Earth and Moon that formed in pairs and were exactly the same age. Astronomers also have noted the changes in brightness of reflected sunlight for some near-Earth asteroids, suggesting that a double system was causing an eclipse or occultation of one by the other.

Amateurs Contribute to Comet Hunt



NASA

Comet C/2002 G3 as seen in SOHO's database images.

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A new comet was discovered over the Internet by a Chinese amateur astronomer visiting the Web site for the Solar and Heliospheric Observatory (SOHO) spacecraft. The comet "C/2002 G3 (SOHO)" was first reported on Friday, April 12, by XingMing Zhou of BoLe city, in the XinJiang province of China, who discovered the comet while watching SOHO real-time images of the Sun on the Internet. The comet is a new comet, not belonging to any known group.

SOHO, launched over six years ago as a project of international cooperation between the European Space Agency (ESA) and NASA, has discovered more than 420 comets in just under six years. This makes the spacecraft the most prolific comet finder in the history of astronomy. Most of the comets were first spotted by amateurs around the world who downloaded SOHO's real-time images to their home computers.

Anyone with Internet access can take part in the hunt for new comets and become a comet discoverer.

"From September 2000 to now I have been trying to find SOHO comets, and I've discovered 13 comets, one of which, designated '2001U9' and initially cataloged by the SOHO project as 'SOHO-367,' was the brightest one in the last two years," said Zhou, who previously spent more

(continued page 13)

MILESTONES

Reid

Arch Reid Named LPI Interim Director

Professor Arch Reid of the Geosciences Department at the University of Houston has been named Interim Director of the Lunar and Planetary Institute. He will replace Dr. David C. Black, who has served as Director of the Institute since 1988. Dr. Black was selected as the President of USRA in January 2001 and has continued his responsibilities as LPI Director. Professor Reid assumed the Interim Director role in early February.

"After being a passive recipient of the support of the Institute and its staff for many years as a No-Cost Visiting Scientist, and along the way enjoying the unique atmosphere of this special place, I am pleased to play a more active role in the affairs of the Institute even for a limited time period," said Dr. Reid. "My goals are to maintain and continue the excellent work of the Institute and to contribute whatever I can to its present and future operations. An important aspect of that task will be to advance the search process that will culminate in the appointment of a new Director."

Dr. Reid has been with the University of Houston since 1987. He served as chairman of the Geosciences Department there from 1987–1993. He has been a visiting scientist at the Institute since 1987 and previously served with the Lunar Science Institute as a principal investigator for the basaltic volcanism project in 1977–1978.

Dr. Reid has also held positions as a visiting scientist with the Johnson Space Center and as a senior doctoral fellow with the NASA Manned Spacecraft Center. In 1975–1986, he served as head of the Department of Mineralogy and Geology at the University of Cape Town and in 1971–1975 he worked in the Planetary and Earth Sciences Division of the NASA Johnson Space Center.

Born in Scotland, Dr. Reid holds a Ph.D. from the University of Pittsburgh, an M.S. from the University of Western Ontario University, and a bachelor's degree from St. Andrews University. He is married and has two children and four grandchildren.

Michigan State Establishes Graham Ryder Memorial Fund

The Department of Geological Sciences at Michigan State University has established a memorial fund in the name of late LPI Staff Scientist Graham Ryder. Dr. Ryder passed away on January 5 as a result of complications from cancer of the esophagus. He was 52.

The fund will support graduate students in the Department. Those seeking more information on the fund can contact Suzette Hittner at 517-353-9855 (hittner@msu.edu). Direct tax-deductible contributions can be sent to Dr. Michael V. Velbel, Chair of the Department of Geological Sciences, 206 Natural Science Building, Michigan State University, East Lansing, MI 48824-1115. Checks should be made payable to Michigan State University.

Dr. Ryder received his Ph.D. from Michigan State University in 1974, specializing in the petrology of igneous rocks.

Those seeking more information on Dr. Ryder's career and legacy can consult the LPI 's Web site at http://www.lpi.usra.edu/graham/ryder.html.

James S. Martin at the JPL in the 1970s.

Mars Viking Leader Dies

Former NASA manager of the Viking missions to Mars, James S. Martin Jr., died April 14, in Rising Sun, Maryland, after a long battle with cancer. Martin was 81.

Viking 1 and *Viking 2*, twin spacecraft launched to Mars in 1975, reached the Red Planet a year later. The two orbiting spacecraft provided the first global maps of Mars and when the two Viking landers touched down on the martian surface, they made history by becoming the first successful mission to soft-land on the surface of another planet. Martin led this unprecedented effort and its 750-person nationwide team of NASA, industry and university engineers, scientists, and technicians.

PUBLICATIONS FROM LPI

QUANTITY	CODE	TITLE	PRICE	TOTAL
		EDUCATIONAL PRODUCTS **You can preview all our educational products by visiting http://www.lpi.usra.edu/education/products/products.html**		
	S-IMPACT	TERRESTRIAL IMPACT CRATERS, SECOND EDITION **(40 SLIDES)**	$25.00	
	S-SOLAR	THE SOLAR SYSTEM IN 3-D **(40 SLIDES)**	$25.00	
	S-VENUS	IT'S A DRY HEAT: THE GEOLOGY OF VENUS FROM MAGELLAN **(40 SLIDES)**	$25.00	
	S-LIFE	ANCIENT LIFE ON MARS??? **(40 SLIDES)**	$25.00	
	S-RED	THE RED PLANET: A SURVEY OF MARS, SECOND EDITION **(40 SLIDES)**	$25.00	
	S-VOLC	VOLCANOES ON MARS **(20 SLIDES)**	$22.00	
	S-HUMAN	SHUTTLE VIEWS THE EARTH: HUMAN IMPRINTS FROM SPACE **(40 SLIDES)**	$25.00	
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	S-HAWAII	VOLCANIC FEATURES OF HAWAII AND OTHER WORLDS **(40 SLIDES)**	$25.00	
	TG-3DTOUR	TEACHER'S GUIDE TO THE 3-D TOUR OF THE SOLAR SYSTEM **(HARD COPY)**	$50.00	
	TG-3DTCD	TEACHER'S GUIDE TO THE 3-D TOUR OF THE SOLAR SYSTEM **(CD-ROM)**	$20.00	
	C-ATLAS	3-D TOUR OF THE SOLAR SYSTEM **(CD-ROM) (VERSION 2.0)**	$15.00	
	C-SSRG	SPACE SCIENCE REFERENCE GUIDE **(CD-ROM)**	$20.00	
	P-3DSTORM	THUNDERSTORMS IN 3-D **(3-D POSTER)** ***NEW PRICE***	$7.00	
	P-3DVOLC	VOLCANO IN 3-D **(3-D POSTER)** ***NEW PRICE***	$7.00	
	R-SPEC-2	ALTA REFLECTANCE SPECTROMETER **(VERSION 2 , 11 COLORS)** A simple classroom instrument designed to help students learn about light, color, and spectroscopy. The ALTA handheld spectrometer weighs only 9 ounces. **(SCIENTIFIC INSTRUMENT)**	$160.00	
	B-RSPECTG	ALTA REFLECTANCE SPECTROMETER CLASSROOM LESSONS **(BOOK)**	$25.00	
	C-RSPECTG	ALTA REFLECTANCE SPECTROMETER CLASSROOM LESSONS **(CD-ROM)**	$10.00	

OTHER PUBLICATIONS **AVAILABLE FOR THE COST OF SHIPPING AND HANDLING**

	CB-954	TRACES OF CATASTROPHE: HANDBOOK OF SHOCK-METAMORPHIC EFFECTS IN TERRESTRIAL METEORITE IMPACT STRUCTURES **(BOOK)**	$0.00	
	CB-969	WORKSHOP ON THERMAL EMISSION SPECTROSCOPY AND ANALYSIS OF DUST, DISKS, AND REGOLITHS **(BOOK)**	$0.00	
	CB-971	NINTH ANNUAL V. M. GOLDSCHMIDT CONFERENCE **(BOOK)**	$0.00	
	CB-979	SECOND ANNUAL HEDS-UP FORUM **(BOOK)**	$0.00	
	CB-1057	SECOND INTERNATIONAL CONFERENCE ON MARS POLAR SCIENCE AND EXPLORATION **(BOOK)**	$0.00	
	CB-1063	THIRD ANNUAL HEDS-UP FORUM **(BOOK)**	$0.00	
	CB-1084	FORUM ON INNOVATIVE APPROACHES TO OUTER PLANETARY EXPLORATION 2001-2002 **(BOOK)**	$0.00	
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than 1600 hours since his 1985 graduation scanning the heavens with his 15-cm F/5.3 reflector telescope to discover a single comet.

"What's exciting about these near-Sun comets is that we are exploring a population of comets that has never been seen before because they are very small and faint," said Douglas Biesecker, a solar physicist with L3 Com Analytics Corporation, Vienna, Virginia. "By the time their orbits take them close to the Sun so they become bright, they are lost in the Sun's glare and require a space-based coronagraph like that on SOHO to be seen."

NASA Selects Explorer Mission Proposals

In April 2002, NASA announced the selection of proposals that would discover the brightest galaxy in the universe, measure the chemical building blocks of life, track magnetic storms in the Earth's magnetosphere, and study massive explosions on the Sun as candidates for the next missions in the agency's Explorer Program of lower-cost, highly focused, rapid-development scientific spacecraft.

NASA has also decided to fund as a "Mission of Opportunity" U.S. participation in a European Space Agency (ESA) observatory on the International Space Station. Following detailed mission concept studies, NASA intends to select two of the mission proposals by early 2003 for full development as Medium-class Explorer, or MIDEX, flights. The two missions developed for flight will be launched in 2007 and 2008.

"The MIDEX program provides an excellent opportunity to explore fundamental questions of science and technology," said Dr. Ed Weiler, associate administrator for space science at NASA Headquarters. "The missions we've chosen fully support NASA's vision to understand and protect our home planet, to explore the universe and to search for life."

The selected proposals were judged to have the best science value among 42 proposals submitted to NASA in October 2001. Each will receive $450,000 ($250,000 for the Mission of Opportunity) to conduct a four-month implementation feasibility study.

The selected MIDEX proposals include The Astrobiology Explorer (ABE) — a cryogenic telescope to determine the abundance, distribution and identities of the chemical building blocks of life. ABE would measure interstellar organic compounds and would be led by Scott Sandford of NASA's Ames Research Center in Moffett Field, California, at a total mission cost to NASA of $180 million.

The Next Generation Sky Survey (NGSS), an infrared telescope designed to survey the entire sky with 1000 times more sensitivity than previous missions, would be led by Edward L. Wright of the University of California, Los Angeles, at a total mission cost to NASA of $180 million.

The Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission, a study of the onset of magnetic storms within the tail of the Earth's magnetosphere, would fly five microsatellite probes through different regions of the magnetosphere and observe the onset and evolution of storms. THEMIS would be led by Vassilis Angelopoulos of the University of California, Berkeley, at a total mission cost to NASA of $150 million.

The Advanced Spectroscopic and Coronagraphic Explorer (ASCE), solar telescopes that would reveal the physical processes in the outer atmosphere of the Sun leading to the solar wind and explosive coronal mass ejections, would carry three solar instruments 100 times better than previous coronal telescopes and would be led by John L. Kohl of the Smithsonian Astrophysical Observatory, Cambridge, Massachusetts, at a total mission cost to NASA of $177 million.

In December, NASA announced the selection of two new missions for study as part of its Discovery Program: KEPLER, with Bill Bourouki at Ames Research Center as the principal investigator, and DAWN, with Chris Russell at UCLA as principal investigator. More information on the DAWN mission is available at http://www-ssc.igpp.ucla.edu/dawn.

NASA Spacecraft Finds Comet Has Hot, Dry Surface

Comets are sometimes described as "dirty snowballs," but a close flyby of one by NASA's *Deep Space 1* spacecraft last fall detected no frozen water on its surface.

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NEWS FROM SPACE

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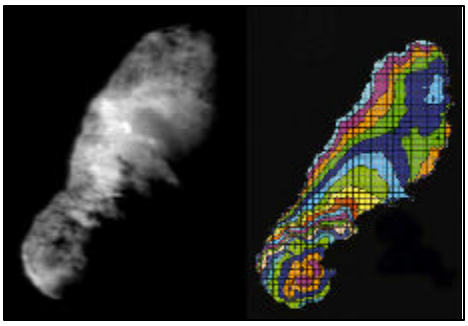

NASA/JPL

Topographical image of Comet Borrelly.

Comet Borrelly has plenty of ice beneath its tar-black surface, but any exposed to sunlight has vaporized away, say scientists analyzing data from *Deep Space 1*, managed by NASA's Jet Propulsion Laboratory, Pasadena, California.

"The spectrum suggests that the surface is hot and dry. It is surprising that we saw no traces of water ice," said Dr. Laurence Soderblom of the U.S. Geological Survey's Flagstaff, Arizona, station, lead author of a report on the Borrelly flyby results appearing in the April online edition of the journal *Science*.

"We know the ice is there," he said. "It's just well-hidden. Either the surface has been dried out by solar heating and maturation or perhaps the very dark soot-like material that covers Borrelly's surface masks any trace of surface ice."

The *Deep Space 1* science team released pictures and other initial findings days after the spacecraft flew within 2171 kilometers (1349 miles) of the comet's solid nucleus on September 22, 2001.

"Comet Borrelly is in the inner solar system right now, and it's hot, between 26° and 71° Celsius (80° and 161°F), so any water ice on the surface would change quickly to a gas," said Dr. Bonnie Buratti, JPL planetary scientist and coauthor of the paper. "As the components evaporate, they leave behind a crust, like the crust left behind by dirty snow."

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Brian Anderson, Editor

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The Bulletin welcomes articles and essays dealing with issues related to planetary science and exploration. Please send articles or announcements to B. Anderson, 3600 Bay Area Boulevard, Houston TX 77058-1113. Copy deadline for the next issue is Feb. 1, 2002.

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CALENDAR 2002

JULY 2002

21–26

65th Annual Meteoritical Society Meeting, University of California, Los Angeles, California.
Contact: Paul H. Warren, Institute of Geophysics & Planetary Physics, UCLA, Los Angeles, CA 90095-1567.
Phone: 310-825-3202; fax: 310-206-3051
http://www.lpi.usra.edu/meetings/metsoc2002/

AUGUST

18–23

12th Annual V. M. Goldschmidt Conference, Davos, Switzerland.
Contact: P.O. Box 27, Cambridge, CB1 8TR, UK
E-mail: conference@the-conference.com
http://www.goldschmidt-conference.com/2002/gold2002/

SEPTEMBER

12–14

The Moon Beyond 2002: Next Steps in Lunar Science and Exploration, Taos, New Mexico.
Contact: Program Services Department, Lunar and Planetary Institute, 3600 Bay Area Boulevard, Houston TX 77058-1113.
Phone: 281-486-2144.
Fax: 281-486-2160
E-mail: Walley@lpi.usra.edu

19–21

Solar System Remote Sensing Symposium, University of Pittsburgh, Pennsylvania.
Contact: See box at right.

OCTOBER

6–11

34th Annual Meeting of the Division for Planetary Sciences of the American Astronomical Society, Ann Arbor, Michigan.
Contact: DPS Chair Mark Sykes
E-mail: Sykes@as.arizona.edu

12–16

Impacts Through the Eyes of Geoscientists and Astronomers, Prague, Czech Republic.
Contact: jakes@natur.cuni.cz or petr.jakes@vednik.cz
http://www.natur.cuni.cz/impact

27–30

Geological Society of America Fall Meeting, Denver, Colorado.
Contact: Geological Society of America
Phone: 303-447-2020 or 1-800-472-1988

DECEMBER

6–10

American Geophysical Union Fall Meeting, San Francisco, California.Contact: AGU, 2000 Florida Avenue N.W., Washington, DC 20009.
Phone: 202-462-6900

FEBRUARY 2003

2–6

Space Technology and Applications Forum (STAIF-2003), Albuquerque, New Mexico.
Contact: Institute for Space and Nuclear Power Studies, The University of New Mexico, Farris Engineering Center, Room 239, Albuquerque, New Mexico 87131-1341.
Phone: 505-277-2813

Remote Sensing Symposium

The scientific symposium Solar System Remote Sensing, honoring the career of Dr. Bruce Hapke, will be held September 20–21, 2002, at The University Club in Pittsburgh, Pennsylvania. The meeting is hosted by the University of Pittsburgh. A banquet honoring Dr. Bruce Hapke will be held on Friday evening, September 20.

For further information regarding the format and scientific objectives of the meeting, please contact one of the conveners:

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